

Claims 79-81 have been rejected under 35 U.S.C. § 112, second paragraph, as indefinite in that the term "the outside" in Claim 79 lacks an antecedent basis. As amended, Claim 79 recites "an outside of the diffractive optical element" which is shown in Figs. 19A and 19B to replace the objected-to term "an outside".

Claims 71, 72, 82 and 83 have been rejected under 35 U.S.C. § 102(b) as anticipated by newly cited U.S. Patent 5,648,874 (Sawaki et al.). Claims 73-81, 84 and 85 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Sawaki et al. With regard to the claims as amended, these rejections are respectfully traversed.

Independent Claim 71 as amended is directed to a diffractive optical element used for the optical element of exposure apparatus. In the diffractive optical element, a peripheral area surrounds an effective area and a light-shielding member composed of a laminated layer of Cr oxide and Cr is on a surface of the peripheral area.

Independent Claim 82 as amended is directed to a diffractive optical element used for the optical system of exposure apparatus. In the diffractive element, a peripheral area surrounds an effective area. A light shielding member composed of any one of (i) chromium, aluminum, molybdenum, tantalum and tungsten, (ii) a laminated structure of any one of chromium, aluminum, molybdenum, tantalum or tungsten and any one of chromium oxide, silicon oxide or aluminum oxide, (iii) a compound material of a metal and silicon, and (iv) a compound of any one of molybdenum or tungsten and silicon, silicon, or titanium oxide, is on a surface of the peripheral area.

In Applicants' view, Sawaki et al. discloses optical apparatus having a first lens array consisting of a plurality of lens which forms a reduced image in reversed orientation and a second lens array consisting of a plurality of lens arranged at

corresponding positions to the lens of the first lens array that forms an erected equal magnification image from the reduced image by expanding the reduced image in the given magnification. One or more light shielding films arranged between the first lens array and the second lens array has through openings for passing light discharged from respective lens of the first lens array at positions corresponding to respective lens of the first lens array in opposition to respective lens for passing discharged light from respective lens of the first lens array.

According to the invention defined in Claims 71 and 82, a diffractive optical element has an effective area, a peripheral area surrounding the effective area and a light shielding member of particular composition on the surface of the peripheral area. Sawaki et al. may teach a light shielding member into which plural diffractive optical elements are placed. For example, referring to Fig. 8 of Sawaki et al., optical elements 51c-1 and 51-c2 are inserted into light shield 33C and optical elements 81c-1 and 81c-2 are inserted into light shield 39C. The Sawaki et al. structure, however, fails to teach or suggest a diffractive element that has both an effective area and a peripheral area surrounding the effective area and further does not teach or suggest the feature of a light-shielding member that is on a surface of the diffractive optical element peripheral area as in Claims 71 and 82. Accordingly, it is believed that Claims 71 and 82 as amended are completely distinguished from Sawaki et al. and are allowable.

Independent Claim 75 as amended is directed to a diffractive optical element used for an optical system of exposure apparatus. In the diffractive optical element, a peripheral area surrounds an effective area and a light shielding member

composed of a material selected from the group consisting of TiC, TiN, ZrC, HfC and HfN, is on a surface of the peripheral area.

Independent Claim 79 as amended is directed to a diffractive optical element used for an optical system of exposure apparatus. In the diffractive optical element, a peripheral area surrounds an effective area. A light shielding member composed of an acrylic or epoxy light-shielding ink on a surface of the peripheral area and an alignment mark used when arranging said light-shielding member into said optical system. The light-shielding ink is not exposed to an outside of the diffractive optical element.

It is a feature of Claims 75 and 79 as amended that a light shielding member is put on a surface of the peripheral area of the diffractive optical element of exposure apparatus. As discussed with respect to Claims 71 and 82, Sawaki et al. is restricted to arrangement wherein optical elements are inserted into light shielding structures. As a result, it is not seen that Sawaki et al.'s diffractive optical elements inserted in a light shielding structure could possibly suggest the arrangement according to Claims 75 and 79 in which a light shielding member is put on a surface of the peripheral area surrounding the effective area of the diffractive optical element. It is therefore believed that Claims 75 and 79 are completely distinguished from Sawaki et al. and are allowable.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record. Applicants submit that the amendments to independent

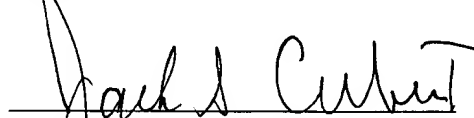
Claims 71, 75, 79 and 82 clarify Applicants' invention and serve to reduce any issues for appeal.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application. The Examiner is respectfully requested to enter this Amendment After Final Action under 37 C.F.R. § 1.116.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

71. (Amended) A diffractive optical element, which is used for an optical system of an exposure apparatus, said diffractive optical element comprising:

an effective area;

a peripheral area surrounding the effective area; and

a light-shielding member composed of a laminated layer of Cr oxide and Cr [at] on a surface of [periphery of an effective] the peripheral area.

75. (Amended) A diffractive optical element, which is used for an optical system of an exposure apparatus, said diffractive optical element comprising:

an effective area;

a peripheral area surrounding the effective area; and

a light-shielding member composed of a material selected from the group consisting of TiC, TiN, ZrC, HfC and HfN, [at] on a surface of [periphery of an effective] the peripheral area.

79. (Amended) A diffractive optical element, which is used for an optical system of an exposure apparatus, said diffractive optical element comprising:

an effective area;

a peripheral area surrounding the effective area; and

a light-shielding member composed of an acrylic or epoxy light-shielding ink [at] on a surface of [periphery of an effective] the peripheral area, and an alignment mark

used when arranging said light-shielding member into said optical system, wherein said light-shielding ink is not exposed to [the] an outside of the diffractive optical element.

82. (Amended) A diffractive optical element, which is used for an optical system of an exposure apparatus, said diffractive optical element comprising:

an effective area;

a peripheral area surrounding the effective area; and

a light-shielding member composed of any one of (i) chromium, aluminum, molybdenum, tantalum and tungsten, (ii) a laminated structure of any one of chromium, aluminum, molybdenum, tantalum or tungsten and any one of chromium oxide, silicon oxide or aluminum oxide, (iii) a compound material of a metal and silicon, and (iv) a compound of any one of molybdenum or tungsten and silicon, silicon, or titanium oxide, [at] on a surface of [periphery of an effective] the peripheral area.